

# HOT IRON #132: February 28, 2026

## THE JOURNAL OF THE CONSTRUCTOR'S CLUB

**Technical Editor:** Please send technical questions and suggestions [to Peter, G6NGR](#)

**Content and Distribution:** Send ideas for content or subscriptions [to Frank, W4NPN](#)

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Our wonderful hobby includes those with a great deal of electronic knowledge as well as those just beginning their journey. Some prefer digital modes and projects, others prefer analog projects and devices that glow in the dark. Our quarterly newsletter, begun by [G3PCJ of Walford Electronics](#), tries to publish something for each, while trying to keep the focus on construction of various devices!

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### Miscellaneous News and items of interest:

\* If you haven't visited the [Internet Archive](#), now's a good time! It contains a huge DLARC library – just enter DLARC in the website's search box and you can find copies of almost all ham radio magazines. *Hot Iron* is there too!

Kay Savetz K6KJN, Internet Archive's Program Manager, Special Collections, recently posted this on Amateur Radio Weekly, and I hope she and ARW won't mind if we publish it here as well, due to the importance of DLARC:

*From Kay: "I have two topics to share this month: first, some of the newest additions to the DLARC library. Then, some of the oldest items in the library have entered the public domain.*

DLARC has scanned 66 issues of the [Proceedings of the Institute of Radio Engineers](#). Adding those to the smattering of IRE Proceedings we had before, the new collection has 80 of these journals ranging from 1917 through 1962. The Institute of Radio Engineers was a professional organization that existed from 1912 until the end of 1962. In 1963, it merged with the American Institute of Electrical Engineers to form the Institute of Electrical and Electronics Engineers (IEEE).

We've added [40 issues of "Call Letter"](#), the newsletter of Northwest Vintage Radio Society. Based in my neighborhood of Portland Oregon, [NWVRS](#) is a nonprofit educational membership organization dedicated to the preservation and enjoyment of vintage radio and antique wireless equipment. Also: 19 issues of [Arizona Antique Radio Club News](#), another fine newsletter from another fine not-for-profit vintage radio preservation group. (The IRE, Call Letter, and Arizona newsletters are the last of the material donated to DLARC by the wonderful [Spark Museum](#) of Electrical Invention.)

We've added 22 issues of an interesting [newsletter devoted to medium/low-frequencies](#), published by Jim Ericson KG6EK. The first issue we have is number 45, where the newsletter is titled "1750 Meters: Western Update" with the wordy subtitle "The Western Newsletter for the Experimenter's Band (160 to 190 KHZ)". By issue 62, the newsletter's name pivoted to simply "Western Update" but with a new equally wordy subtitle: "The Western Newsletter for MF, LF, and VLF Experimenters". It's filled with interesting ideas and anecdotes about low-frequency operation, such as Max Carter's article "[Some quirks of super slow](#)" which discusses the problems of receiving a signal sent at one-tenth baud (10 seconds to transmit one symbol change)!

We have a smattering of issues published from May 1987 through November 1990. I'd love to fill in the gaps, so I've added this one to the ever-shifting [DLARC Wantlist](#). I don't know exactly when the newsletter began or ceased publication. If you have any insight or any issues, please let me know. (Thanks to California Historical Radio Society for these newsletters.)

Aaaaand we've added the complete archive of a little newsletter called [Zero Retries](#)! 256 issues of the independent newsletter about technological innovation in Amateur Radio, published by Steve Stroh <https://hamclock.com/N8GNJ>. It took some serious finagling for Steve to get the text of the issues exported from Substack, and then for me to get them converted into readable PDF files, but it was worth the effort to create a complete, searchable archive of this newsletter in DLARC.

We've added [documents from Quartzfest](#), the "ham radio, camping, learning and living event" hosted near Quartzsite, Arizona, annually since 1997. The archive includes conference schedules, newsletters, and other documentation of that event going back 10 years.

Also check out "[Amateur Radio in Space](#): A Teacher's Guide with Activities in Science, Mathematics, and Technology", a 1998 educational guide to the Space Amateur Radio EXperiment (SAREX)."

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\* **Stealth Antennas:** Many of us live in HOA-controlled communities which prohibit visible antenna installations. Fortunately, W4CAE and the Columbia Amateur Radio Club have [published a compendium of stealth antennas that should be useful to us](#). The book also contains many links to other stealth antenna sources.

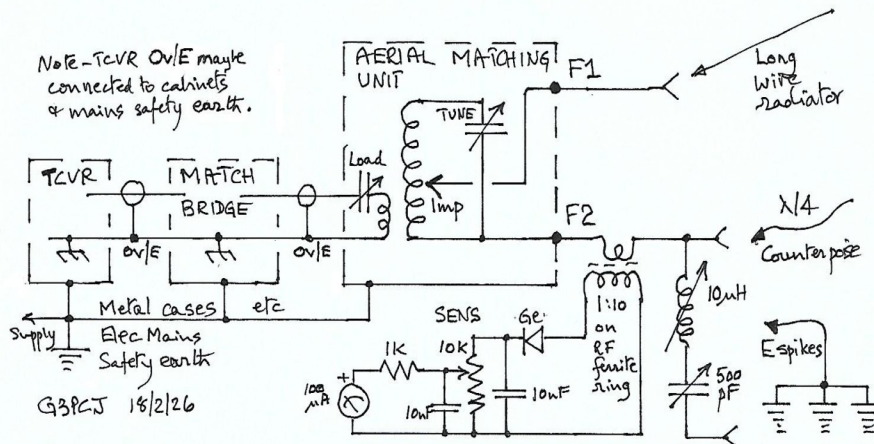
\* **Hamclock Lives!** There was a risk that it would sunset [but this article explains that it has been rejuvenated and what functions and features it contains](#). [Visit hamclock.com to enjoy it](#). [G6NHU provides a good description of Hamclock and how to use it](#).

\* **[SWR Meters Make You Stupid](#)** – this lighthearted explanation of transmission lines, SWR and measurements is very easy to read and covers a lot of topics in one place.

\* **Vintage Receivers:** The RF stage of many older receivers was designed to accept a 300, 400 or 600 ohm antenna input (varies by receiver). If fed by a 50 ohm connection, a significant loss of sensitivity may occur. A quick fix is to obtain an old-fashioned 300-to-75 ohm TV antenna adapter (a matching transformer) and connect the 50 ohm input to the 75 ohm side of the transformer, and the 300 ohm side to the receiver. This can really "perk up" the sensitivity of an older set.

Resonating RF  
Earths  
By Tim Walford  
G3PCJ - Feb 2026

Over the years I have tried many circuit arrangements of HF aerial matching units (AMU), but all of them needed an awkward variable inductance. 'Roller coasters' or sliding ferrite rods into or out of long inductors are most unattractive devices to make – so recently I was trying out a parallel resonant circuit with only a variable capacitor and a toroidal inductor with multiple taps for impedance matching (see the Spring 2026 SPRAT). Sadly, my nearby friends reported it being several S points down on 80m compared to my normal signal. This version has a link coupled RF input for the essential safety aspect of keeping the elec supply mains safety earth (metal cabinets, rig chasses and structural metalwork etc) separate from the RF earthy end at the output of the AMU. (As advised in most National recommendations about preventing shocks between safety and real earths.) I can't fit a centre fed half wave into our garden easily so was using an end fed long wire antenna (near a quarter wave) against what I hoped was a good RF earth. Arranging a 'good ground plane' on the lower HF bands is always tricky due to the size of a quarter wave counterpoise or the challenge of making a good connection to real earth subsoil in the vicinity of your radiating wire. My RF earth was a 1.1 inch copper pipe driven 5ft into our clay, but on checking, I found it measured about 40K Ohms against the elec supply mains earth so at least one of them was bad! Having swiftly remade the dodgy connection to our elec supply safety earth spike, I contemplated how to improve my RF earth. First step was to purchase four proprietary 4 ft long copper plated earthing rods (as used by electricians) and drove them into the soil about 6 ft apart but near the aerial feed point. With good thick short cables, all five 'spikes' then measured in turn about 100R to all of the others electrically linked together. With all 5 linked to the earthy side of my AMU's output, this showed a definite radiation improvement, on a hastily made simple relative field strength meter! But I wondered if a proper quarter wave counterpoise might be even better. I managed to squeeze about 60ft of cable about 8 ft off ground around the back of the house (away from the aerial) when nobody was looking! There appeared to be little difference in radiated signal between the group of spikes and the counterpoise. But what if either of these new RF earths were to be 'resonated' by inserting a series connected inductor and variable capacitor? I found a 500 pF air variable and a length of 1.25 in diameter waste PVC pipe that would do as a coil former. I put about 20 turns of thick house wiring cable on 6 inches of the pipe (about 10 uH) with taps every 2 or 3 turns, and linked this through a ferrite toroid to the earth side of the AMU output terminals. With 10 secondary turns of thin wire on the toroid driving a germanium diode, a sensitivity preset and 100 uA meter, this would provide a good indication of relative RF earth current. Banana plugs and sockets allowed any combination of earths with or without the extra LC. See circuit below. It was quite noticeable how the band background noise level rose up (& with signals etc) as each alternative earthing method was resonated, and with different combinations of L and C. Surprisingly, the group of E spikes appears to make the long wire radiate slightly better than the counterpoise! At time of writing, I hopefully await better reports from afar!



- \* [Here is the “Ham Radio Outside the Box” year end compendium of antenna ideas](#)
- \* [Backup Battery Basics; courtesy of Zero Retries. What you need to know.](#)
- \* Need an explanation of the venerable Smith Chart? [Find it here, in a Nuts and Volts article.](#)
- \* Building a Transmitter? [Go to the right-hand column of this “Construction” web page](#) to find a link to a very comprehensive book on the subject, named “**Build Your Own Low-Power Transmitters,**” ranging from simple analog solid-state construction to PLL and other very sophisticated designs. There is also a link to an old Eimac publication about building a transmitter using tubes.
- \* [This Week in Amateur Radio](#) is a weekly newsletter highlighting events of interest to us Hams. Give it a read!
- \* [Janis \(A.K.A. “Wireless Girl”\)](#) has a web page concerning the various iterations of the venerable 6L6 tube. Information about the 807 and 5933 is also included. You will find information here that I’ve never seen elsewhere, about these tubes. A [visit to her main website](#) is very worthwhile.
- \* [On page 6 of the June, 1967 “73 Magazine,”](#) there’s a good article about using a T200-2 (powdered iron) toroid to make compact output tank coils for transmitters of up to 100 or 1,000 watts. Frank plans to experiment with this in a homebrew junkbox transmitter.
- \* The old moving-coil voltmeters: Most have been replaced by digital ones having a much higher input impedance, but these are not good for use in circuits where the varying current needs to be observed (e.g., turning slugs in an I.F. transformer while reading the result. Such veterans as the Simpson 260 or the Avo 8 are still of good use. [Here’s an ode to the moving-coil voltmeter.](#) This subject was addressed in Hot Iron #112 which was an exceptional issue.
- \* **Soft Start Systems.** Below is a schematic of a soft-start system, provided by Peter Thornton, with some instructions as to its use:

The old dodge of wiring an incandescent lamp in series with the mains for a simple current limit is, in these days of LED lamps, a dying art: the wonderful non-linear effect as the filament heats up has saved many a dodgy circuit from losing it’s ‘magic smoke’ on the unwitting experimenter and surroundings. The circuit is so simple as to not merit drawing; but - how about a switched super-soft or just plain soft start circuit?

This circuit, at the flip of a switch, sets two light bulbs in either series or parallel. If you use a ‘centre off’ toggle switch you’ve got either isolation, a very s-l-o-w start, or, with lamps in parallel, a more energetic start.

Replace the toggle switch with a 2 pole change-over relay and you’ve the makings of an auto starter that can give the softest of starts, and energise the relay once the start surge is over for more ‘oomph’ until the load is fully charged, running or otherwise not demanding amps.



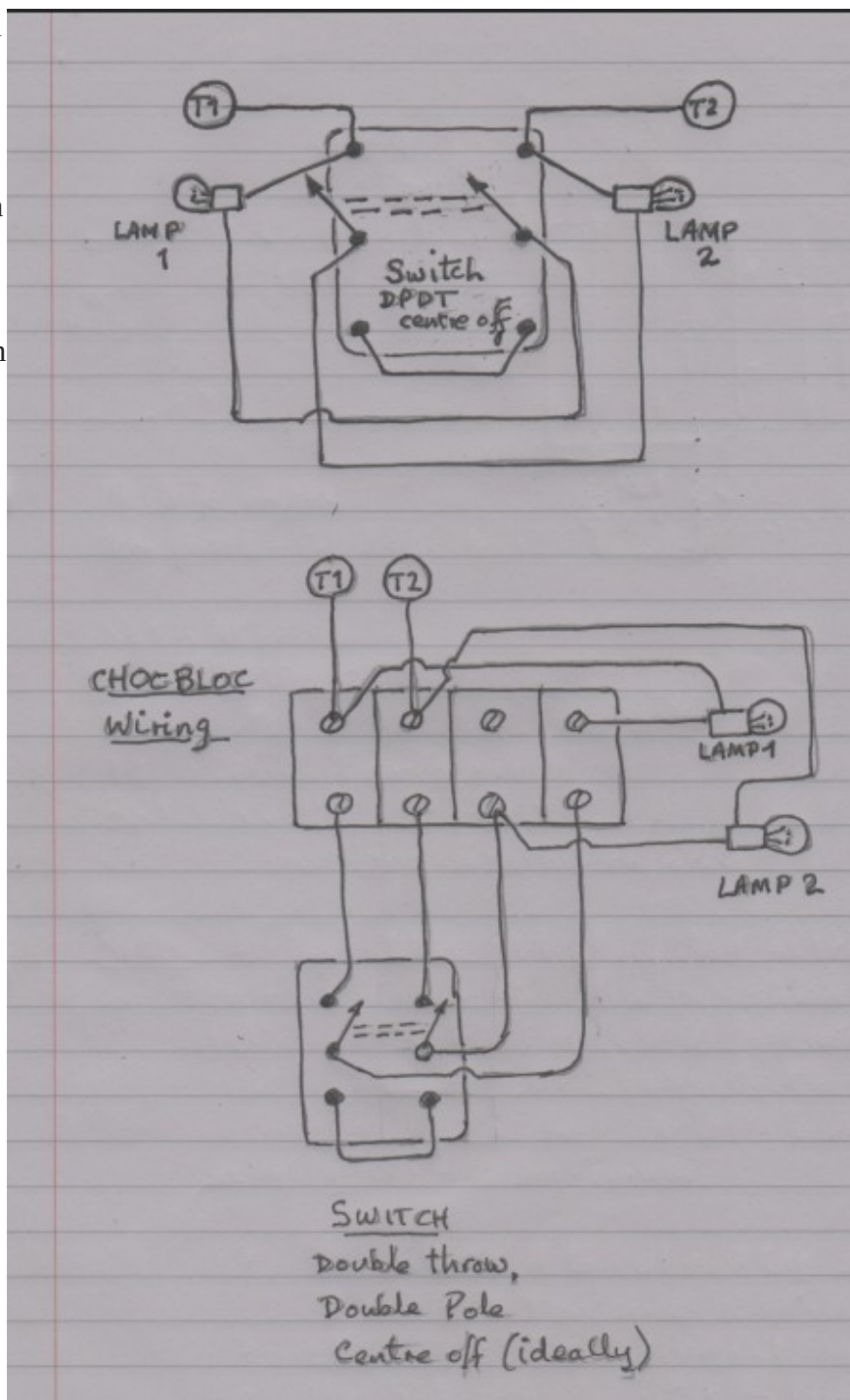
Now, the only issue is filament lamps: these are as rare as hen's teeth nowadays, until you find the high temperature lamps designed for ovens and illuminated grills. These are rated from 20watts to about 60 watts, so if you find a stash of old filament bulbs, treasure them - they are your friends! All this with simple components too: when I first met this circuit it showed me just how ingenious those old boys years ago could be.

**Note: UK marking for 'hot' and 'cold': L = Hot, N = neutral.**

User guide: Wire Terminals T1 and T2 in series with the AC mains live feed to the equipment you want to soft start. Prior to energising, set the switch to 'series' position (highest reading found with multimeter set on 'ohms', testing between T1 and T2 with no other wires attached).

Wire T1 and T2 in series with the AC mains feed to the load wanting protection before energising the power, then energise to run.

The current in the load is limited by the lamps either in series (low soft start) or parallel (high soft start).



\* As a reminder, Soft Start circuits are contained in all microwave ovens having linear power supplies. These are easily removed from the microwave oven control board and converted to ham use. Thermistors can also be used to provide a Soft Start capability. These can even be used in series to achieve even slower starts.

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\* Below we have a repeat of comments from G3PCJ regarding building VFO's but is repeated because of the very good points it makes and the interest it generated:

“Buffer stages after a VFO are certainly desirable but another often overlooked aspect in home designs, is feedback from the PA's output circuit currents/fields into the RF zone surrounding the VFOs inductors. i.e. build large and leave the VFO always running as you mention!!

This feedback is often the root cause of chirp in CW analogue rigs or FMing in DSB rigs.

After that we are into the thermal characteristics of Ls and Cs if the construction is good mechanically. The luxury of avoiding a 'ground-planed' PCB board is not always needed and (I suspect) is not as troublesome until the wanderings due to individual parts has been well controlled.

Frequency doubling or trebling is often the cure to avoid this chirp/FMing aspect for direct conversion designs.

As mentioned to Frank yesterday, I was messing about with an open build where I could blow on individual parts and see how quickly they reacted. It shocked me how awful film trimmers were and how good TOKO style canned inductors were! I had previously used N150 capacitors routinely with nearly all my recent VFO designs but found it better to use so called Class 1 caps which are/used to have the older COG/NPO designation (with black flashes as opposed to the red flash of N150 or purple of the dangerous N750 types!). My trial showed that a small positive tempcoefficient might help if you could get them (I think they were red+violet for P100 and dark grey for P33 according to some web data), but I have failed to find any mention/source of them in any of the regulars suppliers that I use. I suspect there are also huge tempco variations in what different types/forms of inductors are used. I recall that the man at Spectrum in Dorchester (whose devices we often have to use in UK) also maintained that age/mild temp cycling (I suspect after core adjustment) seriously improved them too! If we could find/devise some modern capacitive trimming approach to go with toroids (where there is tempco data available) that would be a great help.”

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\* In Column 3 of this link you will find [A Large Collection of HF, VHF & UHF Amplifier Designs](#). These are solid state analog designs and most are quite simple.

\* [What Really Determines the Efficiency of an Antenna?](#) A Ham Radio Outside the Box article.

\* **Regenerative receivers** seem to live forever. Here are some comments from Peter and a link to a very nice solid state analog circuit:

[https://circuitsalad.com/wp-content/uploads/2015/08/regen\\_simple.jpg](https://circuitsalad.com/wp-content/uploads/2015/08/regen_simple.jpg)

Frank thinks the receiver's upper limit could be raised by having a switched coil. The RF stage should be a big help.

Here's a classic tube design using the excellent 12AT7.

\* **The solid state amplifier (no transistors); it's carbon. And classic.** Here is the Shure article on how to use a carbon mike.

\* Low Frequency operations. **PG1N has a good selection about LF transmitters, amplifiers, antennas,** etc. Frank (W4NPN) expects to soon take possession of a good WWII RBL receiver that tunes from 15 to 600KC. It's a three-stage TRF design with a regenerative detector. This sparks interest in LF operations so we'll see where this takes us. I'll begin by pairing it with a 400 foot on-ground "loop" antenna. If any readers are so interested, please communicate with Frank (fbw4nnpn@gmail.com).

## **Nostalgia Department:**

I do not have permission to cite the name of the individual who provided this but here is a link, below. I watched the video (an old movie from 1929) and it was quite interesting:

*"Nice video on the construction of a 1929 Majestic model 92 radio. Interesting, a mix of both men and women assembling them. Couldn't find the cost of a model 92, but I found that a model 91 went for \$137. That's \$2600 today. Notice two knobs is all you need, On-Off volume, and tuning!"*

<https://youtu.be/HTCYXK-lws0?si=7zAVY6NH1aynSS7A>

## **Trouble-Shooting Section:**

How many of us have had a need to find the source of an equipment malfunction and repair it? I suspect most of us have had to do that, especially with older equipment or during a restoration project. **A series of articles related to troubleshooting** are found on this page, and are repeated below. This is very much a work in progress so please let Frank know of any good articles you have found, at **fbw4nnpn@gmail.com**. I have been unable to find much info about troubleshooting digital circuits but I'll keep looking.

### **A Universal Troubleshooting Guide**

### **Troubleshooting Stage-by-Stage (old tube radios)**

### **Riders Servicing Superheterodynes (an old but still valid pub)**

### **Restoration of Valved Communications Receivers**

### **The Duffer's Guide to Valve Set Fault-finding.**

### **CHRS Hints and Kinks**

### **ARRL Servicing Guide, Part 1**

### **ARRL Servicing Guide, Part 2**

### **ARRL Servicing Guide, Part 3**



## **Trouble-shooting Analog Circuits**

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\* **Keep those old relays working (contact wetting).** This subject was also covered in an old Hot Iron issue, but I can't find the article. Sorry. Here are further comments from Peter about this subject:

*Contacts can be kept functional by using contact wetting (a high-ish volts DC supplied to the contacts via a high value (>1M-ohm) resistor and a silicon diode added in series to the keying line to stop the HV back feeding into the keyer / other electronics. This technique has been covered (several times if my memory serves) in "Hot Iron" eMag.*

*I used this wetting technique technique on relays in a waste acid storage facility where the contacts - even on encapsulated relays - rapidly corroded, I used a bias voltage of +150 volts DC via a 1M resistor and the relay(s) worked reliably for years after that. The high voltage "punches" through the oxide layers, allowing metal-to-metal touching, the signal current now flowing cleans up the contacts.*

**HERE'S SOME OTHER INFO.** on keeping low current switch contacts (typically found in amateur CW keys, etc.) clean and 100% operational. There are many other ways: a small (1 -10 nF capacitor across the contacts to provide a surge of mA's on closure for instance). A Goggle search will find plenty on this topic...![https://en.wikipedia.org/wiki/Wetting\\_current](https://en.wikipedia.org/wiki/Wetting_current)

## **Antenna Stuff:**

\* **Go here for an extensive collection of antenna articles and information, courtesy of AC6LA.**

\* **Go here for another collection of antenna articles and information, from W4NPN.**

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## **Ham Radio Clubs and Organizations:**

**Burnley & District Amateur Radio Club - MX0STB** This club, in Lancashire, currently has 34 members and has recently acquired some surplus gear from another UK amateur.

**Raleigh Amateur Radio Society**, located in Raleigh, NC, USA, is one of the larger U.S. clubs and holds one of the nation's largest "Hamfests" each Spring. It also holds licensing and training sessions and has a significant public service component.

**GQRP low-power club** was formed in 1974 by Rev. George Dobbs G3RJV (SK). It is a non-profit organisation run entirely by volunteers to promote **Low Power Radio (QRP)**. Whether you have a ham license or not - everyone is welcome. The **SPRAT** quarterly magazine provides a fascinating read

containing articles of varying complexity, from simple test equipment, to fully functioning radio transmitters and receivers. You can join the club from the website and have SPRAT mailed to you.

[GQRP also has a YouTube Channel at this link.](#)

[Four States QRP club](#) has ideas and features focused on QRP operations and construction.

[The Michigan QRP club](#) has a simple DC Receiver kit which might still be available.

[Surrey Amateur Radio Communications](#) publishes a professional grade newsletter every two months. Put a link to it on your desktop!

(Let's get your club listed here - send the information to Frank at fbw4nnp@gmail.com!)

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### **Tidbits and Odds and Ends:**

\* William R. Hepburn runs the [DX Info Centre Tropospheric Ducting Forecast](#) website which provides six-day tropospheric ducting information and forecasting for those interested in exploring VHF, UHF and Microwave DX through the use of these ducting channels. These have the necessary atmospheric conditions to produce tropospheric bending of the waves, which extends the range of stations well beyond normal limits.

\* [AM Broadcast Coverage Night Patterns, for U.S. and Canadian MW stations](#) (created by NF8M). Pick any MW frequency and see the typical coverage areas. A unique service!

\* **Antenna Headings:** VU2NSB provides a handy tool to show compass bearings to "everywhere" once your Maidenhead grid square is entered. [Here is the link to that website and service.](#)

\* QRPpppp and WSPR allows you to check your antenna's multi-band transmitting and receiving performance. This article by N2YCH discusses this using available software and common techniques.

\* **Searching for a Net?** [This website by K4HCK helps you to find one in the locality you choose.](#)

\* [Andy's \(KB1OIQ\) Ham Radio Linux Distribution](#) seeks to gather many ham apps compatible with Linux into one location. [This video explains what he has done and continues to do.](#)

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[Go to this web page to see Hot Iron's list of known Ham Clubs, Ham Radio Publications and YouTube Channels. Please let us know of additional ones!](#)

**The W4NPN website hosts the library of Hot Iron issues and provides ham-related information. A list of website major categories is below:**

[Hot Iron \(library of issues, register\)](#)

[RF Amplifiers](#)

[Antenna Information \(Antennas, SWR, Metering, etc\)](#)

[Baluns, Ununs, etc.](#)

[Construction Articles and Ideas](#)

[Power Supplies](#)

[Resources \(many!\)](#)

[Tuners](#)

[VFO's \(a compendium of articles about tube and solid state designs\)](#)

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